

REMARKS

Claims 1 and 7 are pending in this application. Claims 1 is the only independent claim. By this amendment, claim 1 is amended, and claims 2-6 and 8-17 are canceled without prejudice or disclaimer thereto.

Reconsideration in view of the above amendments and following remarks is respectfully solicited.

The Claims Define Patentable Subject Matter

The Office Action rejects claims 1-17 under 35 U.S.C. §103(a) as being unpatentable over Japanese Patent No. JP 3-179672 (hereafter JP '672) in view of Japanese Patent No. 62-279264 (hereafter JP '264) and Japanese Patent No. 4-325401 (hereafter JP '401) or U.S. Patent No. 5,938,800 to Verrill et al. (hereafter Verrill).

This rejection is respectfully traversed.

Applicants respectfully submits that the cited combination of references fail to teach or suggest each and every feature as set forth in the claimed invention.

Specifically, the combination of cited references fail to teach or suggest a hydrogen charge/discharge means composed of a hydrogen storage material comprising at least two members of a hydrogen storing alloy incorporating a heating/cooling means. In addition, the combination of cited references fail to teach or suggest a fluid for cooling the high temperature high purity hydrogen via the indirect heat exchanger is cooling water and hot water heated by the heat exchange is used for heating of a hydrogen delivery means in the hydrogen charge/discharge means composed of the hydrogen storage material.

For example, in the present invention, a reformer uses the difference of the partial pressures of hydrogen in the front and the back of the hydrogen separation membrane as the pressure for the operation. In other words, hydrogen having been reformed by the reformer is occluded by the hydrogen charge/discharge means comprising a hydrogen storing alloy so that the hydrogen permeating side of the hydrogen separation membrane in the reformer may be easily maintained at a stable degree of diminished pressure at all times. In this way, the reforming by means of the reformer can be performed in a highly-efficient manner and very stably.

Furthermore, by arranging two or more pieces of hydrogen storing alloys, during the period in which one hydrogen storing alloy is releasing occluded hydrogen, the other hydrogen storing alloy can occlude hydrogen having permeated through the hydrogen separation membrane in the reformer. In this way, the reforming by means of the reformer can be performed more stably in series.

In addition to the above, the apparatus for producing hydrogen is constructed such that the hydrogen storing alloy is heated with the same heat that is applied to the cooling water and that had cooled the hydrogen from the reformer so that the hydrogen is caused to be released. With such a construction as aforementioned, the thermal efficiency of the system as a whole can be enhanced.

In contrast with the claimed invention, each of the cited references fail to teach or suggest an apparatus for producing hydrogen as claimed nor the operational effects thereof as set forth in amended claim 1.

For instance, the Office Action alleges that JP '672 discloses means for heating, a hydrogen separation membrane, a hydrogen

charge/discharge means, and a pressure regulating means. (see Office Action, page 2, paragraph 3). Applicants respectfully disagree with this allegation.

For example, applicants respectfully submit that JP '672 fails to teach or suggest a hydrogen charge/discharge means composed of a hydrogen storage material comprising at least two members of a hydrogen storing alloy incorporating a heating/cooling means.

Furthermore, as concede by the Examiner, JP '672 fails to teach or suggest a fluid for cooling the hydrogen via a heat exchanger and wherein the hydrogen charge/discharger is a hydrogen storing alloy. (see Office Action, page 3).

In an attempt to make up for the deficiencies found in JP '672, the Examiner imports JP '401, JP '264 and Verrill. However, applicants respectfully submit that each of JP '401, JP '264 and Verrill (either alone or in combination) also fail to teach or suggest the above noted features of the claimed invention. In other words, none of JP '672, JP '401, JP '264 and/or Verrill teaches or suggests the claimed hydrogen charge/discharge means and the fluid for cooling, as set forth in amended claim 1.

To establish a *prima facie* case of Obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must

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both be found in the prior art and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP 706.02(j).

Applicants respectfully submit that the Office Action has failed to establish a *prima facie* case of Obviousness because as noted above the combination of references fail to teach or suggest each and every feature as set forth in the claimed invention.

Applicants respectfully submit that not only does the combination of references fail to teach or suggest each and every feature as set forth in the claimed invention, but that one of ordinary skill in the art would not have been motivated to combine/modify the teachings of the cited references because there is no teaching or suggestion in any of the references themselves regarding how or why one would modify such systems to arrive at the claimed invention.

As such, applicants respectfully submit that independent claim 1 is allowable over the combination of references for at least the reasons noted above.

As for dependent claim 7, which is not particularly discussed above, this claim is also allowable for at least the reasons set forth above regarding its corresponding independent claim, and/or for the further features claimed therein.

Accordingly, withdrawal of the rejection of claims 1-17 under 35 U.S.C. §103(a) is respectfully requested.

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Conclusion

In view of the foregoing, Applicants respectfully submit that the application is in condition for allowance. Favorable reconsideration and prompt allowance are earnestly solicited.

Should the Examiner believe that anything further would be desirable to place this application in better condition for allowance, the Examiner is invited to contact Carolyn T. Baumgardner (Reg. No. 41,345) at (703) 205-8000 to schedule a Personal Interview.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment from or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §1.16 or under 37 C.F.R. §1.17; particularly, the extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASH & BIRCH, LLP

By   
Terrell C. Birch, #19,382

P.O. Box 747  
Falls Church, VA 22040-0747  
(703) 205-8000

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